

AIR QUALITY
MEASUREMENT and PERMITTING
BIOMASS COMBUSTION

Presented By:
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Introduction

- Colorado State Air Pollution Requirements
- Permitting Procedures
- Working with Air Pollution Control Division (APCD)

Heating with Biomass

Space heating

- **Wood Stoves – EPA Certified**
- **Pellet Stoves - Approved**
- **Masonry heaters – Approved**
- **Reg 4 – “Concerning the Sale and Installation of Wood-Burning Appliances and the Use of Certain Wood-burning Appliances During High Pollution Days”**

- **Outdoor Wood Boilers – not recommended**
 - Exempt from Reg. #4 requirements
 - Must still meet
 - Opacity
 - Odor
- **More Discussion**
 - **APCD News release 9/27/2007**
 - **New York Report 2005**



Colorado Department
of Public Health
and Environment

*"To protect and improve
the health and environment
of the people of Colorado."*

NEWS

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Contact: Christopher Dann
Public Information Officer, Air Pollution Control Division
303-692-3281

For Immediate Release

Wednesday, September 26, 2007

Colorado Department of Public Health and Environment Urges Careful Consideration Regarding the Purchase and Installation of Outdoor Wood-fired Boilers

DENVER---The Colorado Department of Public Health and Environment is reminding residents that outdoor wood-fired boilers, which are gaining popularity as an alternative residential energy source, are subject to state air quality regulations and should be purchased and installed conscientiously.

Outdoor wood-fired boilers, or OWBs, are wood-fired water heaters that are located outdoors and are separated from the home or building being heated. At first glance, they look like outdoor sheds with smokestacks.

Fires in the OWBs' large fire boxes heat water that is circulated into the home through underground pipes. The energy may be used to heat houses, shops, domestic hot water, greenhouses, swimming pools and spas.

Colorado retailers have seen a surge recently in the purchase and installation of OWBs as an

Smoke Gets in Your Lungs: Outdoor Wood Boilers in New York State



Eliot Spitzer
Attorney General of New York State
Environmental Protection Bureau
August 2005

Regulatory Requirements

- **EPA Certified or Approved Devices**
 - **DO NOT** require a state issued air permit
- **Must meet**
 - **Regulation # 1 – Opacity**
 - **Regulation # 2 - Odor**
 - **Regulation #4 – Sale, installation and use**
 - **Other local (county/municipal) requirements**

OPACITY

“The degree to which an air pollutant obscures the view of an observer, expressed in percentage of obscuration, or the degree (expressed in percent) to which transmittance of light is reduced by the air pollutant.”

AQCC – Common Provisions

- Fuel Burning Equipment Emission Standards
 - Opacity (Reg. 1, Sec. II.A.1 and II.A.4)
 - Emissions shall not exceed 20% opacity during normal operation.
 - During startup, process modification... emissions shall not exceed 30% opacity.



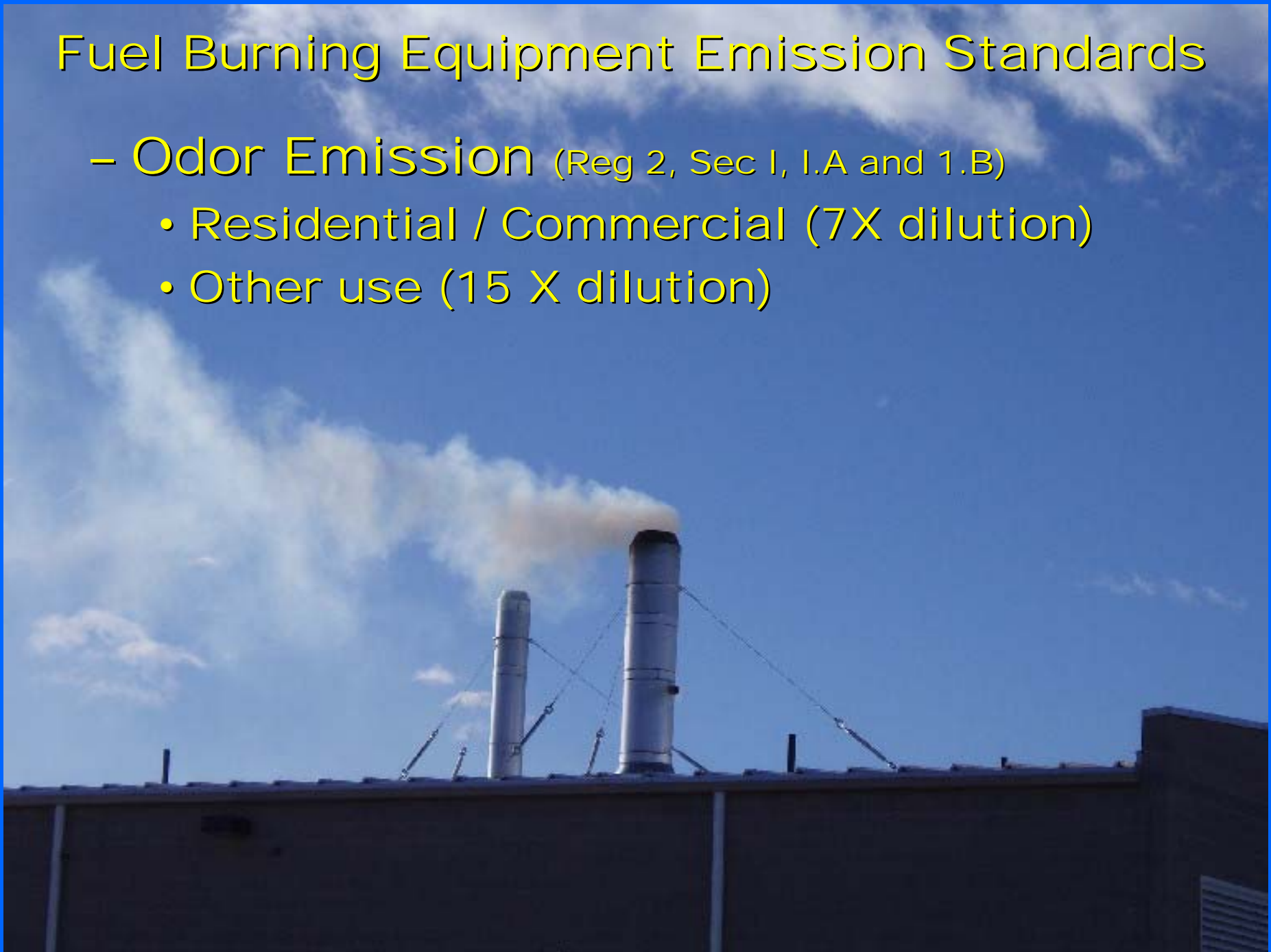
- **Opacity Determined by “trained” Observer using EPA Test Method 9**
- **Smoke School for training and certification**
 - Certification is good for 6 months**
- **Opacity is the average of 24 readings taken every 15 seconds (6 minute duration)**

- This plume has an opacity of about 80 percent

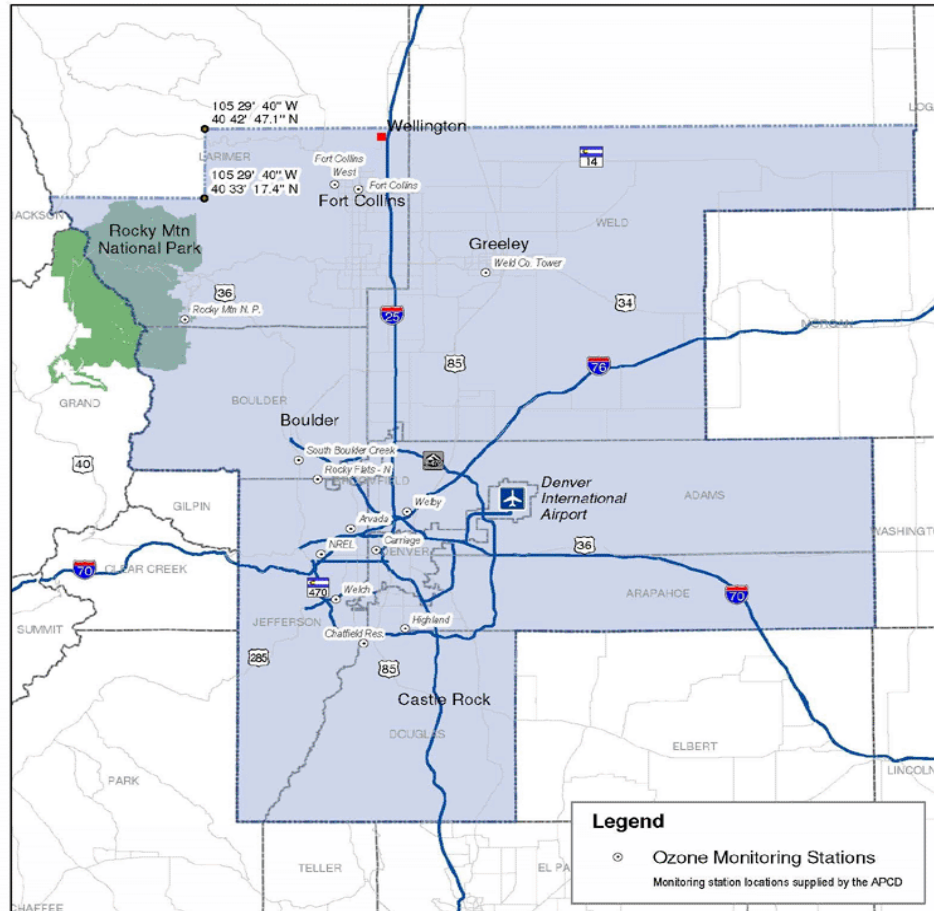


Fuel Burning Equipment Emission Standards

- Odor Emission (Reg 2, Sec I, I.A and 1.B)
 - Residential / Commercial (7X dilution)
 - Other use (15 X dilution)



Denver non-attainment ozone area



Denver-Boulder-Greeley-Fort Collins, Colorado
Eight-Hour Ozone Control Area

Ozone Non attainment area

- **Regulation 3**
- **“...any individual criteria pollutant (pollutants are not summed) for which the area is non attainment”**
- **For ozone – pollutants of interest are**
 - VOCs – volatile organic compounds
 - NO_x – nitrogen oxides

PERMITTING REQUIREMENTS

- **Industrial Boilers (gas, fuel oil, wood)**
- **Rated at > 10 MM BTU per hour**
 - **Subject to Federal requirements –**
 - New Source Performance Standards (NSPS)**
sections Db or Dc
 - **State issued Permit is required**
 - **Submit Air Pollutant Emission Notice (APEN)**

PERMITTING REQUIREMENTS

- **Boilers < 10 MM BTU per hour**
 - **NO Federal Regulations apply**
 - **Subject to State requirements**
 - **Based on Emissions of Criteria Pollutants**
 - **Particulate Matter (PM₁₀, PM_{2.5})**
 - **Carbon Monoxide (CO)**
 - **Nitrogen Oxides (NO_x)**
 - **Volatile Organic Compounds (VOCs)**

PERMITTING REQUIREMENTS

- Boilers < 10 MM BTU per hour

IF - annual uncontrolled emissions are

Non attainment area

PM_{2.5} < 2 tons

PM₁₀ < 2 tons

CO < 2 tons

NO_x < 1 ton

VOC < 1 ton

Attainment area

PM_{2.5} < 2 tons

PM₁₀ < 2 tons

CO < 2 tons

NO_x < 2 tons

VOC < 2 tons

THEN - No reporting is required

PERMITTING REQUIREMENTS

- **Boilers < 10 MM BTU per hour**
IF - annual uncontrolled emissions are

Non attainment area

2 tons < PM_{2.5} < 5 tons
2 tons < PM₁₀ < 5 tons
2 tons < CO < 10 tons
1 tons < NO_x < 5 tons
1 tons < VOC < 2 tons

Attainment area

2 tons < PM_{2.5} < 5 tons
2 tons < PM₁₀ < 5 tons
2 tons < CO < 10 tons
2 tons < NO_x < 10 tons
2 tons < VOC < 5 tons

THEN - Emission reporting is required (APEN)

PERMITTING REQUIREMENTS

- **Boilers < 10 MM BTU per hour**
IF - annual uncontrolled emissions are

Non attainment area

5 tons < PM_{2.5}

5 tons < PM₁₀

10 tons < CO

5 tons < NO_x

2 tons < VOC

Attainment area

5 tons < PM_{2.5}

5 tons < PM₁₀

10 tons < CO

10 tons < NO_x

5 tons < VOC

THEN - A PERMIT and APEN are required

Emission Factor Data

- **Manufacturer's Guarantees**
- **AP-42 Emission Factors (EPA)**
 - Wood residue combustion in boilers - ch 1.6

Emission calculation for Industrial boiler rated at 9.9 million BTUs/hour

- AP 42 factor for NO_x emissions from “Dry wood-fired boiler” = 0.49 lbs/million BTU
- Boiler rated at 9.9 million BTU/hr
- 8760 hours per year
- **NO_x emissions = $0.49 * 9.9 * 8760$**
- **= 42,495 lbs / year or 21.25 tons / year**
- **Exceeds permitting threshold**

Paperwork Requirements

- Emission reporting and obtaining a permit are achieved through the same paperwork process.
- Complete an Air Pollutant Emission Notice (APEN) and submit it to the Air Pollution Control Division (APCD) for review.

AIR POLLUTANT EMISSION NOTICE

PERMIT No.: _____ AIRS ID.: _____/_____/_____

FIRM NAME _____

MAIL ADDRESS _____

STATE: _____ ZIP: _____

PLANT NAME & LOCATION _____

COUNTY: _____

9 REQUEST PORTABLE SOURCE PERMIT HOME-BASE FOR PORTABLE SOURCE _____

PERSON TO CONTACT REGARDING THIS INFORMATION _____ TITLE _____ PHONE _____

GENERAL DESCRIPTION OF THIS PLANT'S FUNCTION _____

E-MAIL ADDRESS: _____

A. GENERAL INFORMATION		Normal Operation of This Source			Process Seasonal Throughput (% of Annual)				ADDITIONAL INFORMATION OR REMARKS:
		Hours/Day	Days/Week	Weeks/Year	Dec-Feb	Mar-May	Jun-Aug	Sep-Nov	

B. STACK OR VENT INFORMATION (Identify below which stack if plant has two or more; refer to attached sketch of plant layout)							
Height	Diameter	Temperature	Flow Rate	Velocity	Moisture	Plant ID No. for Stack	
ft	ft	EF	ACFM	ft/min	%		

C. FUEL INFORMATION		Design Input Rate (10 ⁶ BTU/hr)	Kind of Fuel Burned	Annual Fuel Consumption		Fuel Heating Value: (BTU/lb, BTU/gal, or BTU/scf)	Percent by Weight		Seasonal Fuel Use (% of Annual Use)				Space Htg (% Ann.)
Description of Combustion Unit				Requested level	Actual level (Data year level)		Sulfur	Ash	Dec-Feb	Mar-May	Jun-Aug	Sep-Nov	
Make/Model:													
Serial No.													

D. PROCESS INFORMATION		Raw Materials Used	Raw Materials-Annual Consumption		Design Process Rate (Specify Units/Hour)	Finished Product Description	Finished Product-Annual Output	
Description of Processing Unit		Description	Requested level	Actual level (Data year level)			Requested level	Actual level (Data year level)
Make/Model:								
Serial No.:								

E. POLLUTION CONTROL EQUIPMENT			Overall Collection Efficiency	ESTIMATED EMISSIONS (TONS/YEAR) AT THROUGHPUTS REQUESTED ABOVE		ACTUAL EMISSIONS (from data year)	ESTIMATION METHOD	CHECK ALL BOXES THAT APPLY G New or previously unreported source* G Requesting modification of existing permit H I G Change in emissions, throughputs or equipment I G Transfer of ownership (List previous owner in REMARKS section of box A.) I G Previous APEN is expiring I G Request for Emission Reduction Credit H I G (Specify) _____ * Complete all applicable portions of APEN H Complete ARequested Level@ values for permit limits I Complete all information above box A, and those remaining portions which reflect changes
Pollutant	Type of Control Equipment			CONTROLLED	UNCONTROLLED			
	Primary	Secondary						
Particulate								
PM ₁₀								
SO _x								
NO _x								
VOC								
CO								
PLEASE USE APCD NON-CRITERIA REPORTABLE AIR POLLUTANT ADDENDUM FORM TO REPORT SUCH POLLUTANTS OR POLLUTANTS NOT LISTED ABOVE.				G CHECK HERE IF YOU WISH THE DIVISION TO CALCULATE YOUR EMISSIONS. SEE "EMISSION ESTIMATES" INSTRUCTIONS ON BACK.				

Signature of Person Legally Authorized to Supply Data: _____		DATE: _____	YEAR FOR WHICH THE ACTUAL DATA APPLIES: _____
Typed Name and Title: _____		Date source began or will begin operation: _____	

Time frame and Cost

- The APCD has 90 – 135 days to complete an application review.
- \$152.90 filing fee to submit an APEN.
- Permit processing fees are charged at an hourly review rate of \$76.45 per hour.
- Potential additional costs (up to \$5,000) if compliance testing is required.

- Sources of Assistance
 - Air Pollution Control Division Contact
 - Hugh Davidson - Phone: (303) 692-3157
 - Small Business Assistance Contacts
 - Joni Canterbury - Phone: (303) 692-3175
 - Internet: www.cdphe.state.co.us



ENERGY CONTENT

- **Dry Wood = 8,000 BTU/lb**
- **1 lb wood = 8 scf natural gas**
- **17 lbs wood = 1 gallon diesel**

EPA TEST METHOD 9

OPACITY FACTORS

- **Angle of observer to:**
 - **Plume**
 - **Sun**
- **Luminosity (degree of overcast)**
- **Contrast between plume and background**